

REMARKS

I. Status of the Claims

Claims 20-25 are pending. The specification is amended to update the cross-reference to the parent application, which has now issued. Otherwise, no amendments are made.

II. Response to the Rejection under 35 U.S.C. § 102(b) based on Bottrill

Applicants traverse the rejection of claims 20-25 under 35 U.S.C. § 102(b) as anticipated by Bottrill (U.S. Pat. No. 4,473,672) and respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Bottrill teaches a process involving treating a filler selected from graphite, carbon black, an aluminosilicate clay, mica, talc, vermiculite or glass fibers with a magnesium compound. The treated filler is combined with a transition metal, and an olefin is polymerized with addition of an organoaluminum compound to give a filled polyolefin composition containing from 10 to 90% filler. Bottrill does not teach exfoliated clay-filled polyolefins, as Applicants' claims require.

Smectite clays are well described in the literature (see Izumi, Y. et al., Zeolite, Clay and Heteropoly Acid in Organic Reactions, VCH Publishers Inc. (1992)). Clays are primarily classified into four groups according to their layer charge: (1) pyrophyllite-talc, (2) smectites, (3) vermiculites and (4) micas. Pyrophyllite and talc are electrically neutral. Smectite clay minerals have cation exchange capacity in the range of 60–100 meq/100 g-clay. Bottrill teaches (column 2, lines 3-5) that a "wide range of filler materials may be used in accordance with the process of the invention and they include organic and inorganic fillers."

A wide range of fillers cannot be used to prepare Applicants' claimed exfoliated clay-filled polyolefins. Indeed, Applicants' claims are limited to smectite clays, and other fillers do not provide exfoliation. Bottrill doesn't mention smectite clays, but rather prefers other fillers which cannot exfoliate. In

fact, the Examiner has already acknowledged Bottrill's failure to teach olefin polymerizations that are performed in the presence of smectite clays (see Examiner's Reasons for Allowance, parent application). Carbon black and glass fibers, e.g., cannot exfoliate; they do not have a layered structure. Applicants' claims require smectite clays. While other types of clay may be layered, it is believed that the particular structure of the smectite clay is what enables it to exfoliate in the preparation of Applicants' clay-filled polyolefins. In contrast, other clays, such as talc and mica should not exfoliate.

Among the broad classes of aluminosilicate clays, Bottrill (column 2, lines 15–16) prefers the plate-like materials such as mica, talc and vermiculite. Three of the four major types of clay are mentioned and are preferred. The one type (of the four types) of clay that is not preferred is smectite clay, which is the only clay type suitable for Applicants' composition. Because Bottrill doesn't teach polyolefins filled with exfoliated smectite clays, Bottrill does not anticipate Applicants' invention.

Nor would Applicants' claimed invention have been obvious from Bottrill because nothing in Bottrill suggests exfoliated clay-filled polyolefin compositions.

In conclusion, the Examiner should reconsider and withdraw the Section 102 rejection based on Bottrill.

III. Response to the Rejection under 35 U.S.C. § 102(b) based on Alexandre

Applicants traverse the rejection of claims 20-25 under 35 U.S.C. § 102(b) as anticipated by Alexandre et al. (U.S. Pat. No. 6,465,543), and they respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Alexandre teaches dispersing a hydrophilic clay in water to swell the clay, removing the water from the swelled clay to form an organophilic clay, drying the clay, contacting the clay with an alkyl aluminosilicate to form a clay/alkyl aluminosilicate complex, and contacting the complex with a catalyst followed by an

olefin monomer. The alkyl aluminoxane is preferably MAO, which is reacted with the clay. It is preferable to remove any unreacted MAO (column 3, lines 4–17).

Aside from other differences, the many important distinctions between Alexandre's process and Applicants' process will lead to different compositions. Moreover, Alexandre also uses different reactants that a skilled person appreciates will produce different compositions.

Step (c) of Alexandre is the formation of a clay/alkyl aluminoxane complex. Applicants do not treat the dry clay with an alkyl aluminoxane to prepare a clay/alkyl aluminoxane. Applicants do not use an aluminoxane; instead, they use a different type of aluminum compound, which is well described (page 6, line 22 – page 7, line 5). Because Alexandre uses different reactants and prepares a clay/alkyl aluminoxane, the reference does not teach Applicants' claimed composition.

The Examiner has acknowledged that Alexandre provides no basis for anticipating the process claims now issued in the parent case. In his notice of allowability for U.S. Pat. No. 6,646,072, he wrote:

Alexandre et al. do not teach or fairly suggest a process for polyolefin polymerization in the presence of an organoaluminum cocatalyst which is selected from the group consisting of trialkyl aluminums, triaryl aluminums, alkyl aluminum halides, alkyl aluminum dihalides and mixtures thereof.

Nor would the clay-filled polyolefins resulting from such a process be the same as those now claimed by Applicants. Moreover, because a skilled person lacks motivation to modify Alexandre's teachings in a way that arrives at Applicants' claimed compositions, Applicants' claims also meet the patentability requirements of Section 103.

In conclusion, the Examiner should reconsider and withdraw the Section 102 rejection based on Alexandre.

IV. Response to the Rejection under 35 U.S.C. § 102(b) based on Maxfield

Applicants traverse the rejection of claims 20-25 under 35 U.S.C. § 102(b) as anticipated by Maxfield et al. (WO 95/06090) and respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Maxfield teaches (page 7, lines 34-37) the reaction of a filler with one or more organometallic materials selected from organosilanes, organotitanates, organozirconates, or a combination thereof, where the organometallic material has reacted with the layered particles. Maxfield further states (page 13, lines 22-30) that the organosilanes, organotitanates or organozirconates are critical and have (a) one or more moieties that are reactive with the layers of the layered material and (b) one or more moieties that are reactive with one or more polymer precursor or with the polymer formed to form a covalent bond. The functional groups proposed for the reaction with olefins are described on page 23, lines 31-37. Maxfield's species are dual purpose; they react with the filler to form covalent bonds and also react with the polymer to form covalent bonds. As such, they serve to chemically attach the polymer to the filler.

Applicants do not react their smectite clay with the organometallic species taught by Maxfield. Maxfield teaches the criticality of using an organometallic compound that forms a covalent bond with the monomer or polymer, and Applicants do not use such a compound; therefore, Applicants make a different composition than Maxfield. The Examiner previously recognized (at least implicitly) that Maxfield does not anticipate Applicants' claimed compositions when he stated: "Maxfield does not teach or fairly suggest a process for olefin polymerization in the presence of a Ziegler-Natta catalyst and an organoaluminum cocatalyst" (see Examiner's Reasons for Allowance, parent application). Finally, there is no motivation to modify Maxfield by leaving out the functionalized reactive organometallic species, so the claimed compositions also meet the patentability requirements of Section 103.

In conclusion, the Examiner should reconsider and withdraw the Section 102 rejection based on Maxfield.

V. Conclusion

Applicants respectfully ask the Examiner to reconsider and withdraw the three rejections under Section 102(b), and pass the case to issue. Applicants invite the Examiner to telephone their attorney at (610) 359-2276 if he believes that a discussion of the application might be helpful.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box. 1450, Alexandria, VA 22313-1450 on May 2, 2005.

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